

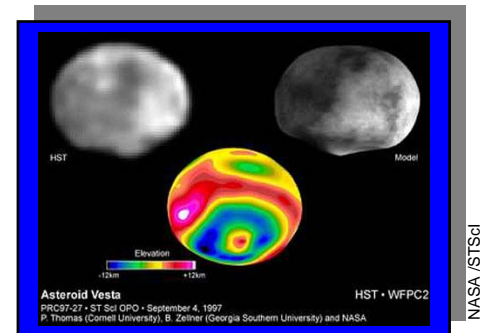
I Can See You More Clearly Now

What is as big as a school bus, travels at a speed of five miles per second, and orbits the Earth every 97 minutes? If your answer is the “**Hubble Space Telescope**” (see “[Dawn Dictionary](#)”), you are right. This magnificent telescope was lifted into orbit by the space shuttle *Discovery* in April 1990 with the expectation that it would provide a much hyped “window on the universe.” This hope was quickly dashed when it was discovered that the primary mirror was slightly misshapen, leading to images that were far inferior to what was expected. Fortunately, in December 1993, astronauts from the shuttle *Endeavour* flew to the rescue by installing replacement parts, including corrective mirrors, which restored the telescope’s razor sharp viewing capabilities. Since that time the Hubble Space Telescope has functioned magnificently and has provided exquisite images of such things as exploding stars, colliding galaxies, and asteroids such as Vesta.



Hubble Space Telescope

Viewing Vesta through telescopes on Earth is very much like standing at one end of a football field and viewing a potato magically suspended at the other end of the field. If your vision is good and the conditions are right, you may be able to see the potato. But would you expect to be able to see lumps and dimples on the potato from this distance? Definitely not. Now imagine walking the length of the football field so that you are now only a few feet away from the potato. Most likely you could see clearly the surface details. In effect, this is what the Hubble Space Telescope has done for views of Vesta. It has closed the distance optically to the extent that surface details on the asteroid as small as 55 kilometers across can be imaged. To continue the potato analogy, we might say that the Hubble Space Telescope provides surface feature images of Vesta that correspond to your being close enough to an average-sized (say 10-cm long) Irish potato to see lumps and bumps roughly 1 cm across.



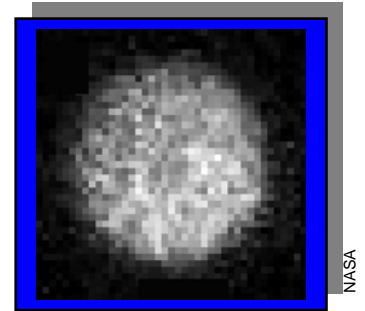
*Hubble Space Telescope
Images of Vesta*

Hubble shows Vesta, which in cross section is about the same size as the state of Arizona, to have a complex surface, making it, according to Ben Zellner of Georgia Southern University, “far more interesting than simply a chunk of rock in space as most asteroids are.” Features such as an exposed **mantle**, ancient lava flows, and **impact basins** were found in 1994, along with the tantalizing observation that one side of the potato called Vesta appeared flattened.

More detailed images were obtained in May 1996 when Vesta made its closest approach to Earth in a decade—a distance of 177 million kilometers. The previously observed flattened surface was resolved to show that Vesta carries an absolutely gigantic impact crater that is about 460 kilometers across, which is nearly equal to Vesta’s diameter! The crater is thought to be about 13 kilometers deep and may go almost all the way through the crust to expose the asteroid’s mantle. Astronomers believe the blast that created the crater was so powerful it caused the asteroid to shift its rotation axis. As a result, the crater is now located near one pole. Finally, through the eyes of Hubble, we can see Vesta more clearly now.

In 2002, scientists also were able to obtain a Hubble Telescope image of Ceres. The picture is fuzzy and looks something like a doughnut. Certainly, Ceres is an interesting asteroid that needs further study.

The Hubble Space telescope has provided new information about Ceres and, particularly, Vesta. However, much remains to be learned about these space potatoes. The Dawn mission will answer many of the tantalizing questions that remain about the origin and nature of these asteroids.



Ceres

Additional Resources

Web Sites

<http://amazing-space.stsci.edu/news/>

The site features a section entitled “The Star Witness,” which offers the latest information captured by the Hubble Space Telescope for space enthusiasts of all ages.

<http://hubblesite.org/newscenter/>

Check out the latest news and pictures captured by the Hubble Space Telescope.

<http://hubble.nasa.gov/>

Visit The Hubble Project Web site, sponsored by NASA Goddard Space Flight Center, to learn about the history, technology, and operations of the Hubble Space Telescope.

<http://www.seds.org/hst/>

This NASA site features the “Best of the Hubble Space Telescope” images.

Print Resources

McSween, H.Y. (1999). *Meteorites and their parent planets*. Cambridge; NY: Cambridge University Press.

Peebles, C. (2000). *Asteroids: A history*. Washington, DC: Smithsonian Institution Press.

Roth, G.D., (1962). *The system of minor planet*. Princeton, NJ: Company Inc.